

BEST AVAILABLE COPY

REMARKS

Please find enclosed herewith a revocation of the previous Power of Attorney in this application and the appointment of new Powers of Attorney, including the undersigned attorney for the applicants.

Claims 1-18 have been cancelled, not because of the cited art, but to better address the important features of this present invention.

Claims 1-18, the previous claims, had been rejected under 35 U.S.C. 102 based upon US Patent No. 6,821,147 to Hall, et al (the '147 patent). The features found in new Claims 19-41 are neither disclosed nor suggested in the Hall '147 patent. The Hall patent is directed to the use of a coaxial cable used in what is commonly referred to in this art as "dedicated drill pipe." This basically means only that the electrical wires are embedded in the individual sections of the drill pipe which must then be connected from one section of the drill pipe to the next. Fig.3 of the Hall '147 patent exemplifies the reason of its inapplicability to the present Claims 32-41. The outside sheath of the coaxial cable is made out of metal identified by the numeral 70 in Fig.3, also shown in more detail in Fig.6. The metal sheath runs along the entire length of the cable in each section ("joint") of the dedicated drill pipe described in the Hall '147 patent so it would be physically impossible for the seals which are used in the Hall patent to be longer than the insulation provided between the metal sheath and the interior conductor of the cable. Each of the newly added Claims 32-41 call for the insulation seal to be longer than the metal body itself, and which as discussed below, provides an increased arc length between the electrical conductor and the metal body. This is not possible when practicing under the Hall '147 patent.

Claims 32-41 have been drawn to reflect the features of the insulation seal being longer in length than the length of the metal body. None of the elements in Claims 32-41 are new matter, but are fully disclosed and described within the specification and drawings originally filed. For example, the Examiner's attention is respectfully directed to paragraph 0044 found on page

4 of the publication U.S.2005/0186823A which is a publication of this present application. In paragraph 0044 there is language indicating that the extensions 40 and 44 are longer than the metal body 12 and as such, provide a longer arc path between the conductor 18 and the metal body 12.

A favorable consideration is also requested for Claims 19-31. Each of Claims 19-31 calls for the insulation seal to comprise a layer of glass having a melting point of greater than 500°F. Connectors having the capability to operate in deep earth boreholes having temperatures in excess of 500°F and pressures in excess of 30,000 psig. are not known in this art. These limitations are not new matter, but are discussed, for example, on page 2 of Publication No. 2005/0186823, in Section [0014]. Glass seals having melting points below 500°F simply cannot function as seals in 500°F formations surrounding deep earth boreholes. It should be appreciated that fiberglass, as suggested in the Hall, et al reference, would not be used as a glass seal in 500°F environments. Fiberglass is typically made either from fabric having glass threads, or from a plastic having glass threads, but is known to begin deteriorating at 400°F. The Examiner will find enclosed herewith a document from a commercial user of fiberglass, identified as Exhibit A, showing the 400°F usage.

The Examiner's attention is also respectfully directed to Claims 26-30, each of which is dependant upon Claim 19, which are directed to the use of a thermoplastic jacket applied in an initial position over the electrical conductor and over one end of the metal body, which moves to a second position for sealing against the electrical apparatus when subjected to high temperature and high pressure. The combination of the glass seal which has a melting point above 500°F with the thermoplastic jacket is a major advancement in this art, a combination which is neither disclosed nor even suggested by the prior art.

It is therefore respectfully submitted that newly added Claims 19-41 fully distinguish over the art of record, including the Hall '147 patent and the newly added Claims 19-41 are believed to be in prima facie condition for allowance.

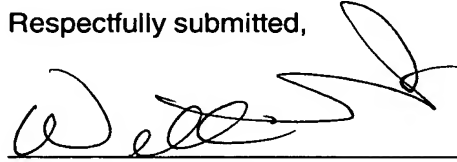
The one (1) month extension fee of \$60.00 is enclosed. The Commissioner is

authorized to charge any additional fees which might be due or payable to Deposit Account No. 13-2166.

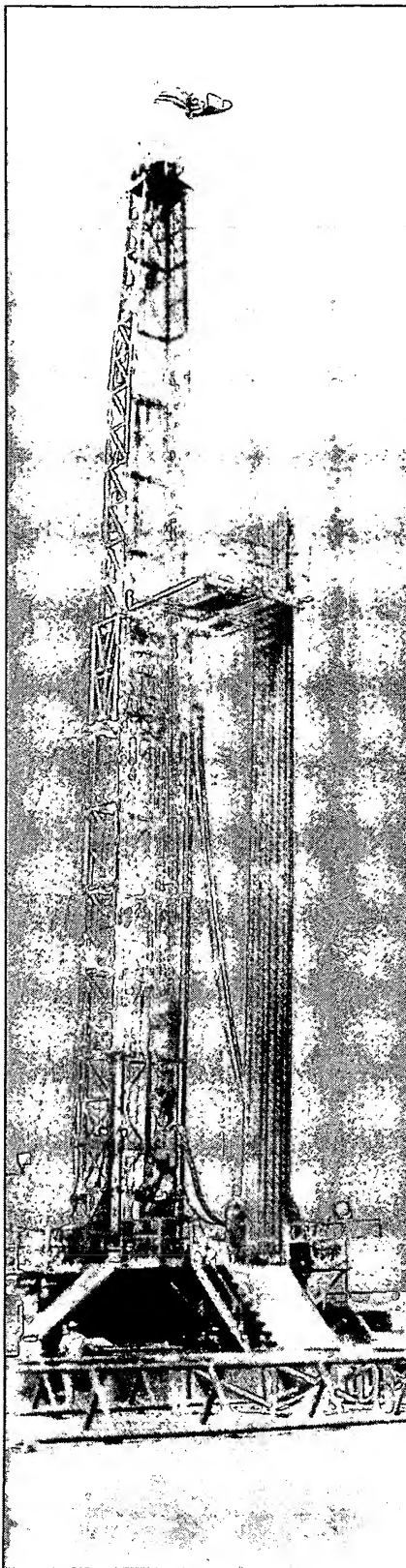
Undersigned counsel for the applicants would appreciate a telephone conference with the Examiner should the Examiner be of the opinion that such a conference would assist in the further prosecution of this matter.

12/24/06
Date

Respectfully submitted,



William E. Johnson, Jr.
Reg. No.: 22,719
THE MATTHEWS FIRM (Customer No. 021897)
2000 Bering Drive, Suite 700
Houston, Texas 77057
US
713-355-4200 Telephone
713-355-9689 Facsimile

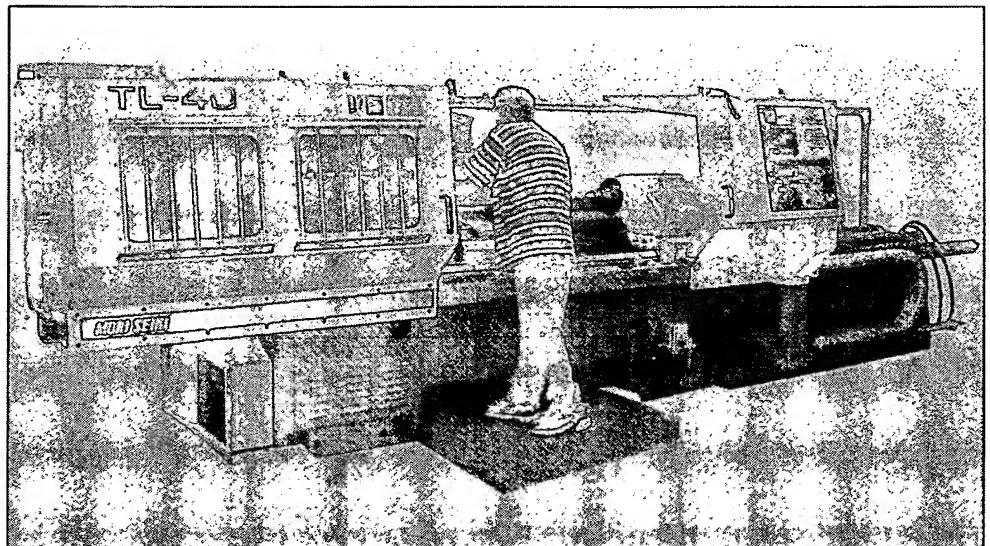


© 2002 KEYSTONE ENGINEERING COMPANY

KEYSTONE ENGINEERING COMPANY

QUALITY CUSTOM METAL AND
COMPOSITE MACHINED PARTS

SINCE 1950



6310 Sidney Street

P.O. Box 14666

Houston, TX 77221-4666

Tel: 713-747-1478

Fax: 713-747-8227

e-mail: sales@keystoneeng.com

www.keystoneeng.com

KEYSTONE

KEYSTONE ENGINEERING COMPANY

Since 1950 Keystone Engineering Company has maintained a proven reputation for reliable service to industry. Three manufacturing plants cover over 50,000 square feet. Thus we can insure prompt delivery of machined parts made from advanced composite materials and metals. Strict documented quality control and inspection procedures insure that all manufactured products are made from only the finest materials and to exact client specifications. All our departments are committed to high quality workmanship and service.

CUSTOM MACHINE WORK AND MANUFACTURING CAPABILITIES

Keystone maintains a broad based, multi-disciplined manufacturing operation including special equipment for high technology products. Our total in house capabilities guarantee excellence in workmanship from prototype development through production runs. Some of these capabilities include plunge EDM, gun drilling, 5th axis milling, composite fabrication, shot peening of metals, standard lathe and 4th axis milling.

PLASTIC MOLDING: Automatic and semi-automatic injection and transfer molding of Epoxies, Fluorocarbon resins, Polycarbonates, Polyimides, Aromatic Polyethers, and high performance materials. High temperatures are used, with injection pressures up to 42,000 PSI and clamping force up to 100 tons.

RUBBER MOLDING: Conventional transfer and compression molding of Neoprene, Nitriles, Fluoroelastomers, and proprietary compounds.

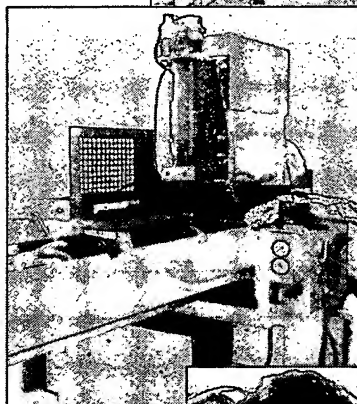
PRECISION MACHINE WORK: Keystone does virtually all machine work in house utilizing numerous modern CNC lathes and mills, which include plunge EDM, 5th and 4th axis milling. Prototype and small lot production can be done on conventional engine and turret lathes, mills, centerless and surface grinders, drill and punch presses, shears and saws. We have seven long bed lathes with capacities up to 24 inches swing and 20 feet long work piece. All fixtures and molds are made in-house.

WELDING: For critical hermetic welds that are Helium tight to 10-9cc/ sec, Keystone utilizes computer controlled Laser and an Electron Beam. These processes are provided by our affiliate company and are used where Keystone assemblies require close tolerances, dissimilar metals, and thin sections. Induction brazing and oven brazing are available. TIG and Plasma welding are used for non-critical applications.

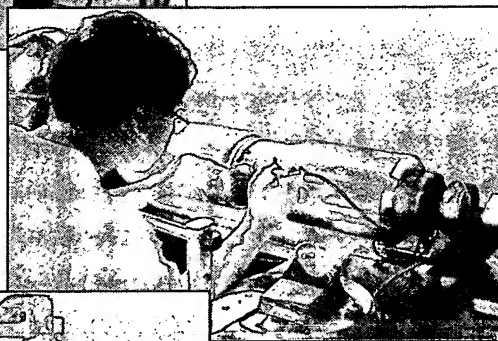
5th axis
milling



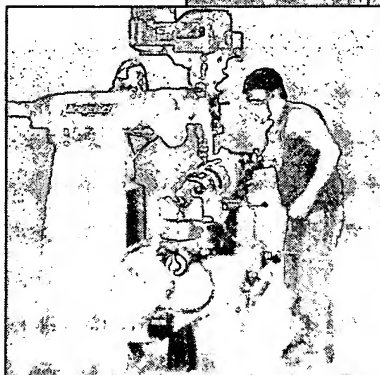
EDM



assembly



manual
machining



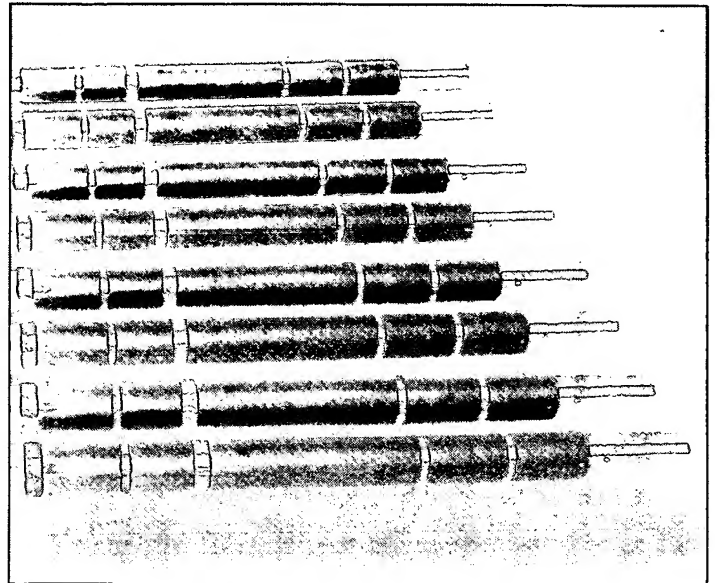
KEYSTONE

DOWNHOLE INSTRUMENTATION

Keystone Engineering is a leader in the manufacture of downhole high strength and high temperature laminates. Our standard Kemlox "G" material is ideal for Mandrels and Cover Sleeves operating from 350°F to 400°F in a downhole environment. Where higher temperature resistance is required Keystone utilizes Kemlox HT-2 material.

Keystone has proprietary bonding techniques for metal-fiberglass-rubber, void free resin systems, and fabric styles. Keystone has the total in house capability for the contract manufacture of a wide variety of oilfield downhole instrument assemblies, from a prototype developmental stage to production runs. All client drawings and products are handled confidentially and treated as proprietary information.

Down hole logging tools which incorporate our composite materials may include dual induction, lateral log, and resistivity types. Our material acts as an electronic window while still providing insulation, strength and chemical resistance at 350°F plus temperatures. Keystone fabricates machines and assemblies coil patterns for both wireline and MWD tools. Other uses may be strength members and tube liners.



QUALITY CONTROL

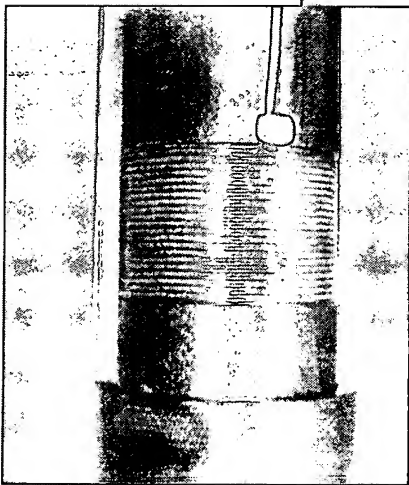
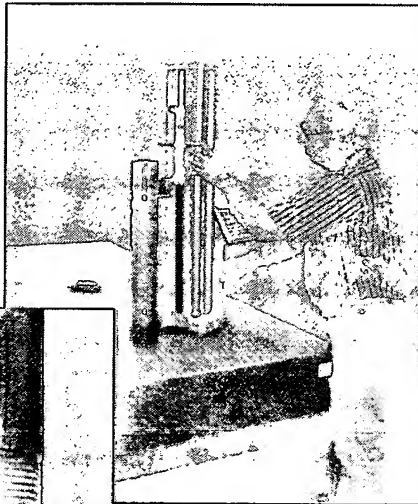
Keystone Engineering maintains a quality control program with complete manufacturing documentation and traceability. The program is in accordance with and exceeds MIL 9858-A for military systems requirements and is designed to achieve ultra reliable products. A written schedule for calibrating gages, measuring, and test equipment is strictly followed in accordance with MIL 45562.

ENGINEERING SERVICES

Keystone's has on staff a registered professional engineer with "hands-on" experience in utilizing technology and materials suitable for downhole, geophysical, aerospace, marine, and chemical use. Keystone also designs our own molds, jigs, fixtures, presses, gages, tooling and special proprietary equipment for the complete manufacturing process.

QUOTATIONS

Keystone Engineering is responsive to the industry with fast, accurate price quotations and deliveries. Our Sales and Engineering staff are glad to discuss how we can solve your design and composite material problems, from prototype development through production runs. All inquiries are handled in confidence.



KEYSTONE

MATERIALS

Keystone offers a variety of industrial fabrics for strength reinforcement and many different binder systems. The fabric material can be comprised of E Glass, S Glass, Graphite, Ceramic, or Kevlar fills. Some of our typical binder systems use Epoxy, Polyester, and Phenolic resins.

Ultra high product quality is achieved through a combination of proprietary resin injection methods and wet wrapping techniques

Keystone Engineering has several other proprietary resin systems with heat resistances from 400°F to 450°F for downhole and industrial use. We will be glad to discuss how our other high-temperature resin systems can serve your needs.

RESIN SYSTEMS

Keystone Engineering fabricates a standard epoxy laminate which approaches the maximum obtainable properties for a fiberglass reinforced material. Keystone's Kemlox "G" material has good strength at high temperatures, excellent thermal and electrical properties, good machinability, and outstanding chemical resistance. Where higher temperature resistance is required, Keystone has available HT-2 material. Keystone's standard fill is E-Glass. Keystone also incorporates other fabric fills such as Graphite, Kevlar, Ceramic, and S-Glass.

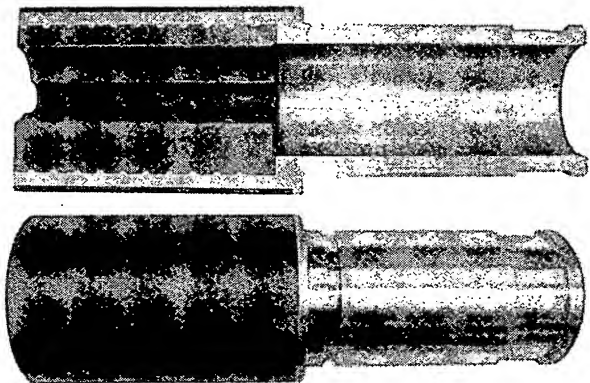
Our standard resin systems can incorporate all of these different fills to achieve different properties. Table 1 compares the heat resistance, density, toughness, stiffness, cost, and impact resistance of these fabric fills. Our standard Kemlox "G" cannot be molded, but is available in several different standard patterns. The two most-requested patterns are listed below.

PATTERN K-143

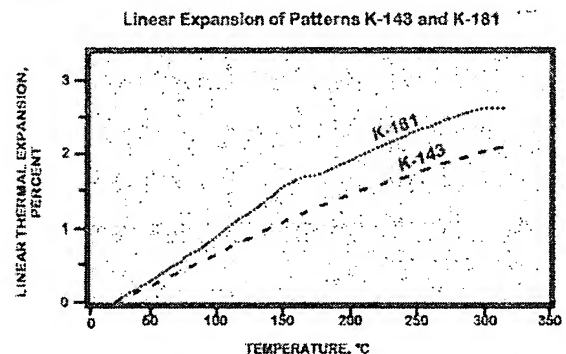
Pattern K-143 has about 80% of its reinforcement orientated in the axial direction of the rod or tube. Thus the K-143 pattern produces an epoxy laminate with a very high tensile strength. The flexural and tensile strength are greater than the K-181 pattern. The K-143 pattern is ideal for tensile-loaded rods and cylinders.

Table 1: Comparison of Fabric Materials

PROPERTY	←—————→					HIGHEST
HEAT RESISTANCE	GRAPHITE	KEVLAR	E GLASS	S GLASS	CERAMIC	
DENSITY	CERAMIC	E GLASS	S GLASS	GRAPHITE	KEVLAR	
TOUGHNESS	GRAPHITE	CERAMIC	E GLASS	S GLASS	KEVLAR	
STIFFNESS	E GLASS	CERAMIC	S GLASS	KEVLAR	GRAPH-ITE	
COST	E GLASS	S GLASS	KEVLAR	GRAPHITE	CERAMIC	
IMPACT RESISTANCE	GRAPHITE	CERAMIC	E GLASS	S GLASS	KEVLAR	



Part made from titanium, fiberglass and rubber



PATTERN K-181

Pattern K-181 has approximately 50% of its reinforcement in both the axial and radial direction. It has a better burst and compressive strength than the K-143 pattern. The K-181 pattern is ideal for downhole tubes and thinwall sections.

KEYSTONE

KEMLOX HT-2 FIBERGLASS LAMINATE

MATERIAL SPECIFICATIONS

Resin Content		30-35%
Heat Deflection Temperature		420 °F
Density		0.07 lb/in ³
Tensile Strength (K-181 pattern)	Room Temperature	70 kpsi
	270 °F	62 kpsi
	420 °F	45 kpsi
Tensile Strength (K-143 pattern)	Room Temperature	75 kpsi
Compressive Strength	Room Temperature	70 kpsi
	270 °F	62 kpsi
	420 °F	50 kpsi
Flexural Strength	Room Temperature	4.1 kpsi
	270 °F	3.9 kpsi
	420 °F	3.3 kpsi
Rockwell Hardness at Room Temperature, M scale		106/110
Izod Impact Resistance at Room Temperature, Ft lb/ in of notch		14-16
Thermal Conductivity		7×10^{-4} cal/sec/cm ² /°C
Volume Resistivity		$10^{12} - 10^{13}$ ohm/cm
Dielectric Strength, kV/.06"		4.6 at 1 mHz
Insulation Resistance at Room Temperature		20 megohms
Coefficient of Thermal Expansion, Radial		7.00×10^{-6} in/in/°F
Coefficient of Thermal Expansion, Longitudinal		4.00×10^{-6} in/in/°F
Young's Modulus		4.00×10^6
Duty Cycle		2 hour at 400 Fand up to 20 kpsi
Magnetic Permeability		Same as air

KEYSTONE ENGINEERING COMPANY

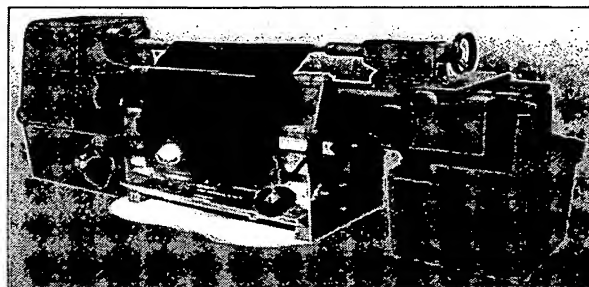
6310 Sidney Street
P.O. Box 14666
Houston, TX 77221-4666

Tel: 713-747-1479

Fax: 713-747-8227

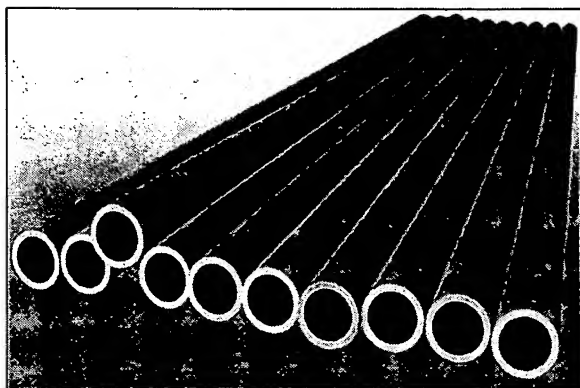
e-mail: sales@keystoneeng.com

www.keystoneeng.com



DISCLAIMER Data contained herein is based on tests conducted on representative samples, either from our own testing or from unconfirmed data supplied by resin or fabric manufacturers and falls within the normal range of product properties. However, this data should not be used to establish specification limits nor used alone as a basis for design. Seller assumes no obligation or liability for any advice furnished by it or for the results obtained with respect to these products. All such advice is provided gratis and Buyer assumes sole responsibility for results obtained in reliance thereon. It is suggested that the purchaser conduct tests to determine if these materials are suited to their application. All specifications are subject to change without notice.

KEMLOX "G" FIBERGLASS LAMINATE MATERIAL SPECIFICATIONS



4"od by 16' fiberglass tubes

PROPERTY	K-143	K-181
Specific Gravity	1.82	1.82
Resin Content, %	30 to 35	30 to 35
Heat Resistance, *F	400	400
Flexural Strength, PSI	80,000 to 95,000	64,000 to 72,000
Flexural Modulus, PSI x10 ⁶	3.0 to 3.5	3.0 to 3.5
Compressive Strength, PSI		54,000
Tensile Modulus, PSI x10 ⁶	58,000	25,000
Dielectric Constant, KCS	4.1 to 5.5	4.1 to 5.5
Dielectric Strength, Volts/Mil, short time, .12" thickness	500	500
Volume Resistivity, Ohm-cm, @ 50% relative humidity	1 X 10 ¹⁵	1 X 10 ¹⁵
Impact Strength, Izod	12 to 15	12 to 15
Hardness, Rockwell M	115 to 117	115 to 117
Flame Resistance	Self Extinguishing	Self Extinguishing
Color	Red, Black or Blue	Red, Black or Blue
Water Absorption, % weight gain after 24 hours	0.05 to 0.07	0.05 to 0.07
Linear Coefficient of Expansion, X10 ⁻⁶ in/in *F	4.0	4.0

CHEMICAL	% WEIGHT CHANGE, IMERSION TIME, DAYS		
RESISTANCE	50	180	365
Acetic Acid, 10%	+0.29	+0.62	+0.73
Acetone	+0.33	+1.00	-
Ammonium Hydroxide, 28%	+0.70	+2.30	+2.40
Ammonium Nitrate, 50%	+0.21	+0.60	+0.73
Ethyl Acetate	+0.45	+0.45	+0.72
Ethylene Glycol	-0.03	-0.23	+0.09
Hydrochloric Acid, 10%	0.00	-0.09	-0.32
Hydrochloric Acid, 37%	-0.21	-5.70	-
Hydrogen Peroxide*	-	-	-
Isopropyl Alcohol	-0.02	-0.05	+0.01
Jet Fuel	+0.08	+0.14	+0.32
Methyl Ethyl Ketone	+0.24	+0.34	+0.35
Nitric Acid, 30%	-0.21	-4.80	-
Nitric Acid, 50% **	-	-	-
108 Octane Gasoline	+0.07	+0.13	+0.31
Phosphoric Acid, 10%	+0.27	+0.54	+0.65
Phosphoric Acid, 98%	+0.10	+0.74	+0.90
Sodium Chloride, 20%	+0.24	+0.40	+0.67
Sodium Hydroxide, 1%	+0.17	+0.36	+0.50
Sodium Hydroxide, 50%	-0.23	-1.30	-
Sodium Sulfate, 30%	+0.24	+0.64	+0.74
Sulfuric Acid, 3%	-0.09	-	+0.09
Sulfuric Acid, 70%	+0.20	+0.34	+0.42
Sulfuric Acid, 95/0***	-	-	-
Water, Distilled	+0.21	+0.67	+0.63

* Delaminated

** Top layer delaminated

*** Delaminated after 7 days

KEYSTONE ENGINEERING COMPANY

6310 Sidney Street

P.O. Box 14666

Houston, TX 77221-4666

Tel: 713-747-1479

Fax: 713-747-8227

e-mail: sales@keystoneeng.com

www.keystoneeng.com

DISCLAIMER

Data contained herein is based on tests conducted on representative samples, either from our own testing or from unconfirmed data supplied by resin or fabric manufacturers and falls within the normal range of product properties. However, this data should not be used to establish specification limits nor used alone as a basis for design. Seller assumes no obligation or liability for any advice furnished by it or for the results obtained with respect to these products. All such advice is provided gratis and Buyer assumes sole responsibility for results obtained in reliance thereon. It is suggested that the purchaser conduct tests to determine if these materials are suited to their application. All specifications are subject to change without notice.

© 2002 KEYSTONE ENGINEERING COMPANY

KEYSTONE

**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☐ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKÉWED/SLANTED IMAGES
- ☒ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☒ GRAY SCALE DOCUMENTS
- ☒ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.